CLAIMS

What is claimed is:

1. A method for implementing smart DSL for LDSL systems, the method comprising:

defining a candidate system to be implemented by an LDSL system;
optimizing criteria associated with the candidate system; and
selecting a candidate system to implement in an LDSL system.

2. The method of claim 1 wherein defining a candidate system further comprises:
determining features of upstream transmission.

3. The method of claim 2 wherein determining features of upstream transmission further comprises:
determining one or more of: cut-off frequencies, side lobe shapes, overlap, partial overlap or FDD characteristics.

4. The method of claim 1 wherein defining a candidate system further comprises:
determining features of downstream transmission.

5. The method of claim 4 wherein determining features of downstream transmission further comprises:
determining one or more of: cut-off frequencies, side lobe shapes, overlap, partial overlap or FDD characteristics.

6. The method of claim 1 wherein optimizing criteria associated with the candidate system further comprises:

optimizing criteria associated with the candidate system to fulfill upstream and downstream performance targets.

7. The method of claim 1 wherein selecting a candidate system to implement in an LDSL system further comprises:
selecting a spectral mask for use with upstream or downstream transmission.

8. The method of claim 1 wherein selecting a candidate system to implement in an LDSL system further comprises:
selecting a candidate system during modem handshake procedures.

9. The method of claim 1 wherein defining a candidate system to be implemented in an LDSL system further comprises:
defining a number of upstream masks (U1, U2, U3, …, Un) and a number of downstream masks (D1, D2, D3, …, Dn).

10. The method of claim 9 wherein one of the number of upstream masks is defined by the following relations, wherein f is a frequency band in kHz and U1 is the value of the mask in dBm/Hz:
for $0 < f \leq 4$, then $U1 = -97.5$, with max power in the in 0-4 kHz band of +15 dBm;
for $4 < f \leq 25.875$, then $U1 = -92.5 + 23.43 \times \log_2(f/4)$;
for $25.875 < f \leq 60.375$, then $U1 = -29.0$;
for $60.375 < f \leq 90.5$, then $U1 = -34.5 - 95 \times \log_2(f/60.375)$;
for $90.5 < f \leq 1221$, then $U1 = -90$;
for $1221 < f \leq 1630$, then $U1 = -99.5$ peak, with max power in the $[f, f + 1$ MHz$]$ window of $(-90 - 48 \times \log_2(f/1221) + 60)$ dBm; and
for $1630 < f \leq 11040$, then $U1 = -99.5$ peak, with max power in the $[f, f + 1$ MHz$]$ window of -50 dBm.

11. The method of claim 9 wherein one of the number of downstream masks is defined by the following relations, wherein f is a frequency band in kHz and D1 is the value of the mask in dBm/Hz:

for $0 < f \leq 4$, then D1 = –97.5, with max power in the in 0-4 kHz band of +15 dBrn;

for $4 < f \leq 25.875$, then $D1 = -92.5 + 20.79 \times \log_2(f/4)$;

for $25.875 < f \leq 81$, then D1 = –36.5;

for $81 < f \leq 92.1$, then $D1 = -36.5 - 70 \times \log_2(f/81)$;

for $92.1 < f \leq 121.4$, then D1 = –49.5;

for $121.4 < f \leq 138$, then $D1 = -49.5 + 70 \times \log_2(f/121.4)$;

for $138 < f \leq 353.625$, then $D1 = -36.5 + 0.0139 \times (f - 138)$;

for $353.625 < f \leq 569.25$, then D1 = –33.5;

for $569.25 < f \leq 1622.5$, then $D1 = -33.5 - 36 \times \log_2(f/569.25)$;

for $1622.5 < f \leq 3093$, then D1 = –90;

for $3093 < f \leq 4545$, then D1 = –90 peak, with maximum power in the [f, f+1 MHz] window of $(-36.5 - 36 \times \log_2(f/1104) + 60)$dBm; and

for $4545 < f \leq 11040$, then D1 = –90 peak, with maximum power in the [f, f+1 MHz] window of –50 dBm.

12. The method of claim 9 wherein one of the number of upstream masks is defined by the following relations, wherein f is a frequency band in kHz and U2 is the value of the mask in dBm/Hz:

for $0 < f \leq 4$, then U2 = –97.5, with max power in the in 0-4 kHz band of +15 dBrn;

for $4 < f \leq 25.875$, then $U2 = -92.5 - 22.5 \times \log_2(f/4)$;

for $25.875 < f \leq 86.25$, then U2 = –30.9;

for $86.25 < f \leq 138.6$, then $U2 = -34.5 - 95 \times \log_2(f/86.25)$;

for $138.6 < f \leq 1221$, then U2 = –99.5;

for $1221 < f \leq 1630$, then U2 = –99.5 peak, with max power in the $[f, f + 1\ \text{MHz}]$ window of $(-90 - 48 \times \log_2(f/1221) + 60)$ dBm; and

for $1630 < f \leq 11040$, then U2 = –99.5 peak, with max power in the $[f, f + 1\ \text{MHz}]$ window of –50 dBm.

13. The method of claim 9 wherein one of the number of downstream masks is defined by the following peak values, wherein f is a frequency in kHz and D2 is the peak value of the mask in dBm/Hz:

for $f = 0.0$, then D2 = -98.0;

for $f = 3.99$, then D2 = -98.00;

for $f = 4.0$, then D2 = -92.5;

for $f = 80.0$, then D2 = -72.5;

for $f = 120.74$, then D2 = -47.50;

for $f = 120.75$, then D2 = -37.80;

for $f = 138.0$, then D2 = -36.8;

for $f = 276.0$, then D2 = -33.5;

for $f = 677.0625$, then D2 = -33.5;

for $f = 956.0$, then D2 = -62.0;

for $f = 1800.0$, then D2 = -62.0;

for $f = 2290.0$, then D2 = -90.0;

for $f = 3093.0$, then D2 = -90.0;

for $f = 4545.0$, then D2 = -110.0; and

for $f = 12000.0$, then D2 = -110.0.

14. The method of claim 9 wherein one of the number of upstream masks is defined by the following peak values, wherein f is a frequency in kHz and U3 is the peak value of the mask in dBm/Hz:

for $f = 0$, then U3 = -101.5;

for f = 4, then U3 = -101.5;

for f = 4, then U3 = -96;

for f = 25.875, then U3 = -36.30;

for f = 103.5, then U3 = -36.30;

for f = 164.1, then U3 = -99.5;

for f = 1221, then U3 = -99.5;

for f = 1630, then U3 = -113.5; and

for f = 12000, then U3 = -113.5.

15. The method of claim 9 wherein one of the number of downstream masks is defined by the following peak values, wherein f is a frequency in kHz and D3 is the peak value of the mask in dBm/Hz:

for f = 0, then D3 = -101.5;

for f = 4, then D3 = -101.5;

for f = 4, then D3 = -96;

for f = 80, then D3 = -76;

for f = 138, then D3 = -47.5;

for f = 138, then D3 = -40;

for f = 276, then D3 = -37;

for f = 552, then D3 = -37;

for f = 956, then D3 = -65.5;

for f = 1800, then D3 = -65.5;

for f = 2290, then D3 = -93.5;

for f = 3093, then D3 = -93.5;

for f = 4545, then D3 = -113.5; and

for f = 12000, then D3 = -113.5.